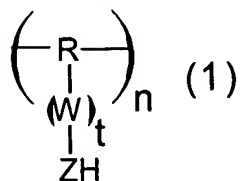


Claims

1. A process for imaging a photoresist comprising the steps of,
5 a) forming a coating of a photoresist on a substrate;
b) forming a barrier coating over the photoresist from a barrier coating solution;
c) imagewise exposing the photoresist and the barrier coating using immersion lithography, further where the immersion lithography comprises an
10 immersion liquid between the barrier coating and exposure equipment; and
d) developing the coatings with an aqueous alkaline solution.
2. The process of claim 1, where the barrier coating is insoluble in the immersion liquid.
- 15 3. The process of claim 1, where the immersion liquid comprises water.
4. The process of claim 1, where the barrier coating is soluble in an aqueous alkaline solution.
- 20 5. The process of claim 1, where exposure is with radiation between 150 nm and 450nm.
6. The process of claim 1, where exposure is with radiation between 150 nm
25 and 300 nm.
7. The process of claim 1, where the photoresist is sensitive to exposure wavelength between 150 nm and 450 nm.
- 30 8. The process of claim 1, where the barrier coating comprises an alkyl alcohol solvent and a polymer comprising an ionizable group.
9. The process of claim 8, where the polymer comprising the ionizable group has a pKa ranging from about -9 to about 11.

10. The process of claim 8, where the polymer has the structure



5 where, R is a polymeric backbone, W is a spacer group, ZH is the ionizable group, and t=0-5.

11. The process of claim 8, where R is selected from a multicyclic polymeric backbone, a monocyclic backbone, a linear aliphatic backbone, a branched
10 aliphatic backbone, an aromatic backbone, a fluorinated alkyl backbone, and mixtures thereof.

12. The composition of claim 8, where ZH is selected from $-\text{C}(\text{C}_n\text{F}_{2n+1})_2\text{OH}$ (n=1-8), $-\text{PhOH}$, $(\text{SO}_2)_2\text{NH}$, $(\text{SO}_2)_3\text{CH}$, $(\text{CO})_2\text{NH}$, SO_3H , PO_3H and CO_2H .

15 13. The composition of claim 8, where the polymer is poly(3-(bicyclo[2.2.1]hept-5-en-2-yl)-1,1,1-trifluoro-2-(trifluoromethyl)propan-2-ol).

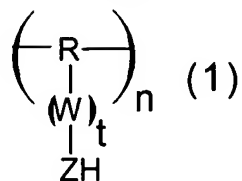
14. The process of claim 8, where the solvent is selected from an alkyl alcohol
20 with the structure $\text{HOC}_n\text{H}_{2n+1}$, where n is between 3 and 12.

15. The process of claim 8, where the solvent further comprises an n-alkane solvent with the structure $\text{C}_n\text{H}_{2n+2}$, where n is between 3 and 12.

25 16. The process of claim 1, where the aqueous alkaline solution comprises tetramethyl ammonium hydroxide.

17. A barrier coating solution for a photoresist imaged with immersion lithography, where the barrier coating comprises an alkyl alcohol solvent and a
30 polymer comprising an ionizable group, further where pKa of the ionizable group ranges from about -9 to about 11.

18. The composition of claim 17, where the polymer has the structure



5 where, R is the polymeric backbone, W is a spacer group, ZH is the ionizable group, and t=0-5.

19. The composition of claim 18, where R is selected from a multicyclic
polymeric backbone, a monocyclic backbone, a linear aliphatic backbone, a
10 branched aliphatic backbone, an aromatic backbone, a fluorinated alkyl backbone
and mixtures thereof.

20. The composition of claim 18, where ZH is selected from $-\text{C}(\text{C}_n\text{F}_{2n+1})_2\text{OH}$
(n=1-8), $-\text{PhOH}$, $(\text{SO}_2)_2\text{NH}$, $(\text{SO}_2)_3\text{CH}$, $(\text{CO})_2\text{NH}$, SO_3H , PO_3H and CO_2H .

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21. The composition of claim 18, where the polymer is poly(3-
(bicyclo[2.2.1]hept-5-en-2-yl)-1,1,1-trifluoro-2-(trifluoromethyl)propan-2-ol).

22. The composition of claim 17, where the solvent is selected from an alkyl
20 alcohol with the structure $\text{HOC}_n\text{H}_{2n+1}$, where n is between 3 and 7.

23. The composition of claim 17, where the solvent further comprises an n-
alkane solvent with the structure $\text{C}_n\text{H}_{2n+2}$, where n is between 3 and 7.